Art. XIV.—*New or Little-known Victorian Fossils in the National Museum.*

Part IX.—Some Tertiary Species.

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(With Plates XVII.-XIX.).

[Read 12th December, 1907].

The following notes are based on some tertiary fossils which have been set aside from time to time as deserving of description or further comment. With regard to the echinoids, no new forms are here described, since other workers are engaged upon this group; but the opportunity is taken to figure, and record a new locality for Linthia antiaustralis, and to record additional localities and stratigraphical information regarding three other interesting species.

The forms here dealt with are: —

Cliona mammillata, sp. nov.
? Cliona peregrinator, sp. nov.
Ecionema newberyi, McCoy, sp.
Heliastraea tasmaniensis, Duncan.
Comoseris (Oroseris) australis, sp. nov.
Studeria elegans, Laube sp.
Linthia antiaustralis, Tate.
Maretia anomala, Duncan.
Eupatagus rotundus, Duncan.
Ischnochiton (Ischnoplax) granulosus, Ashby and Torr sp.

Class—Spongida.

Order—*Monactinellida.*

Genus—*Cliona*, Grant.

Cliona mammillata, sp. nov.

(Pl. XVIII., Fig. 3).

Specific Characters.—The chambers excavated by the sponge are comparatively large, irregularly spheroidal and depressed.

In nearly all cases they bore smaller loculi on their lateral walls, and these appear in the casts as mammillate protuberances. Cavities connected by rather long and and conspicuously curved stolons. Average diameter of chambers, 4 mm. ; length of connecting stolons, about 3 mm. ; width, 0.5 mm.

These borings occur on the surface of the internal cast of a Voluta having a length of 16.5 cm., and the Cliona crypts entirely cover the spire and a large part of the body-whorl.

Observations.—In the absence of spicules it is difficult to separate the fossil casts of the boring sponge Cliona by characters which may be regarded as specific. In the present instance, however, certain features are exhibited which we can use for future reference, and we may therefore reasonably give it a distinguishing name. As an example of Cliona borings already specifically described we may refer to Cliona ("Entobia") cretacea, Portlock[1] a common form in Cretaceous shells in Britain and elsewhere, which is recognised by its regularly spheroidal form, crowded chambers and comparatively fine, radiating system of stolons.

Locality and Horizon.—Swan Reach, Bairnsdale Lakes. Tertiary (Kalimnan). Pres. by Mr. H. J. Hauschildt. [9146].

? Cliona peregrinator, sp. nov.

(Pl. XVIII., Fig. 4).

Specific Characters.—Crypts globular to pyriform, sometimes united into a more or less lengthy tube. The passages from chamber to chamber are often reduced to a mere constriction and there is also evidence of occasional, long slender stolons. Diameter of an average-size globular chamber, 2.5 mm. ; length of pyriform chambers, rather less. The habit of this organism in the wandering manner of its growth is unlike the majority of Clionae. The fossil occurs on the surface of a limestone cast of a coral, Comoseris, into the coenenchyma of which it had bored in the errant manner described.

Locality and Horizon.—Valley of the Moorabool at Maude. Tertiary (Barwonian). Coll. Geol. Surv., Vict. WTM2. [9153].

1 Geol. Londonderry, 1843, p. 360. See also Cliomtes conybeari, Morris ; Ann. Mag. Nat. Hist., vol. viii., 1851, pl. viii., fig. 9.

Order—Tetractinellida.

Genus—*Ecionema*, Bowerbank.

Ecionema newberyi, McCoy sp.

(Pl. XVII., Figs. 1-13).

Tethya newberyi, McCoy, 1877, Prod. Palaeont. Vict., Dec. V., p. 31, Pl. XLVIII., Fig. 1.

Observations.—Having recently examined the above type specimen [9145], I am able to record the presence of typical tetractinellid spicules (protriaene), in reference to which McCoy remarked[1] as follows:—"I have not seen any triradiate terminations to any of the spicules such as occasionally occur with the simple forms in the recent Tethya, but they are so brittle that such may yet well be found." In his description, McCoy compares this fossil sponge with Tethya cranium, which species is now removed to the genus Craniella, Schmidt. Among the spicules of the Victorian fossil sponge are numerous microscleres, which are absent in all the forms of Craniella referred to by Sollas,[2] excepting C. schmidtii. This species alone possesses sigmaspires: the microscleres of our fossil, however, are represented, amongst other forms, by the simpler modification, the microstrongyles. The known species of Craniella are distinguished by numerous megalosclereres of the form anatriaene, but these are absent in our specimen.

With regard to Tethya, the definition of the genus as now restricted and given by Sollas (op. cit. p. 427) is as follows:—

"Tethyidae of more or less spherical form, in which the rhabdus is a strongyloxea. The chamber-system is diplodal." This definition excludes our fossil, since all the oxea are bluntly pointed, in contradistinction to the cylindrical strongyloxea.

The genus with which the Victorian fossil appears to show most agreement, both in regard to form and spicular structure, is Ecionema, which includes at least two species found in southern Australian waters—viz., E. australiense, Carter sp. and E. bacilliferum, var. robusta, Carter var.

1 Loc. cit., p. 31.

2 Chall. Rep., vol. xxv., 1888. Report on the Tetractinellida, pp. 30-41.

The genus Ecionema is defined by Sollas[1] as "Rhabdastrose Stellettidae, in which the ectosome does not form a cortex, with two forms of microscleres, one of them being a microrabd, derived either from an anthaster or a chiaster by reduction in the number of the actines to two."

In the present specimen there are at least four types of microscleres; spherasters, sterrasters, microstrongyles and the microrabds (probably derived from a chiaster). It may subsequently be found necessary to form a new genus for the reception of this sponge should other specimens occur, but for the present it may be referred to Ecionema.

Extended Description.—In addition to the characters noted by McCoy, we may state that the spicules consist both of the large (megalo-scleres) and the small types (microscleres). The former consist of—(1) long arcuate or sigmoidal spicules pointed at both ends (oxea), generally smooth, sometimes slightly spinose; and (2) tetraradiate spicules of the form protriaene, with the three short rays directed away from the main axis, sometimes curved, but more often straight, forming an angle of about 45 deg. from the axis of the rhabdus produced. There are also occasional dichotriaene, in which the three radial cladi are bifurcate, and with the main actines suppressed, after the manner of Ecionema nana, Carter sp.[2] The microscleres consist of—(1) arcuate or open V-shaped microrabds, cylindrical and with rounded ends (micro-strongyles), bearing surface tuberculations and depressions; (2) a ?spiraster, with blunt spines, especially near one extremity; (3) a microxea with whorls of spines; (4) a spheraster, with moderately long arms carrying two or more spines at the extreme tips; (5) a depressed ellipsoidal sterraster, with ?hilum nearly central; and (6) a sanidaster slightly tapering to one end, and armed with numerous short spines.

Dimensions of the Spicules.—The chief skeletal spicules are the oxea, which are nearly always slightly curved: the greatest length they appear to attain is about 5 mm., although McCoy says "some apparently about 1 inch long."[3] They are massed

1 Loc. supra cit., p. 195.

2 Annals and Mag. Nat. Hist., ser. v., vol. vi., 1880, pl. vii., f. 43.

3 Loc. cit., p. 31.

together in a closely fasciculate manner. The examples now figured measure as follows:—(Pl. XVII., Fig. 1). Length, 2.346 mm.; greatest breadth, 0.0721 mm. A slightly sigmoidal spicule (Pl. XVII., Fig. 2), length, 1.6 mm.

Protriaene.—A variety with straight cladi, 0.423 mm. long; length of cladi, 0.154 mm. Cladi making an angle of 48 deg. with the produced rhabdus. A variety with curved cladi having a length of 0.481 mm.; cladi forming an angle of 30 deg. A variety with the cladi sigmoidally curved, 0.461 mm. in length; width of chord, 0.25 mm.

Dichotriaene.—Rays of the trivium lying nearly in the same plane. That which would ordinarily be considered the principal actine is almost entirely suppressed. An example from this sponge has an extreme diameter of 0.48 mm.

Microstrongyles.—Length of an average example, 0.423 mm.; width, 0.0384 mm.

The ?spiraster.—Length, 0.346 mm.

Microxea with spines in whorls.—Length, 0.25 mm.; width, 0.1 mm.

Spheraster.—Diameter of centrum, 0.0576; length of longest rays, 0.0432 mm.

An ellipsoidal sterraster.—Longer diameter, 0.153 mm; shorter diameter, 0.11 mm.

A sanidaster with a length of 0.336 mm.

Class—Anthozoa.

Family—*Astraeidae.*

Genus—*Heliastraea*, Ed. and Haime.

Heliastraea tasmaniensis, Duncan.

H. tasmaniensis, Duncan, 1876, Quart. Journ. Geol. Soc., Vol. XXXII., p. 342, Pl. XXII., Figs. 1-3.

Observations.—An example of this coral occurs as a cast in ironstone, and is sufficiently well preserved to furnish a sharp wax impression, clearly showing the number of primary and secondary septa and their quaternary arrangement, as described by Duncan. The corallum measures about 4 cm. square, whilst the calices have a diameter of about 4 mm.

Near to one side of the corallum in this specimen there occurs what is evidently a malformed calice of the same stock, forming a funnel-shape depression about 15 mm. across, and surrounded by a ring of calices of the normal form. The malformed calice suggests at first sight that of an Agaricia, but a cast of the bottom of the calice shows it to be similar to that of the smoller corallites of the group.

Locality and Horizon.—Flemington ("Royal Park"). Probably from the Vict. Geol. Surv. coll. Tertiary (Barwonian). [9155].

Family—Thamnastraeidae.

Genus—*Comoseris*, D'Orbigny.

Sub-Genus—*Oroseris*, Edwards and Haime.

Comoseris (Oroseris) australis, sp. nov.

(Pl. XVIII., Figs. 1, 2).

Description.—The present example occurs in the form of a ferruginous limestone cast. Base of corallum encrusting. Calices measuring about 6 mm. in diameter; arranged in a widely flexuous series, and divided by moderately high, rounded, flexuous ridges. Septa (trabeculae) sinuous, strongly curved or angulate, granulate on the sides, and united by synapticula; about 20 main septal plates, some of which branch into two, usually at a distance of about one and a half millimetres from the centre of the calice, continuous with the costae of the ridges. Sometimes the branching of the septa occurs nearly at the summit of the ridge. Columella small, formed of the united ends of the septa. Depth of calices about 5 mm. From top of ridge to bottom of calice, 9 mm.

Observations.—The corallum of the type species has been extensively invaded by a boring sponge (?Cliona), the casts of whose crypts stand up prominently on the fossil coral.

The coral before us bears some resemblance to certain forms of Stylomaeandra and Latimaeandra, both of which have the calices situated between collines or ridges; the former genus having a styliform columella, whilst the latter is deficient in that respect. A closer examination of the septal arrangement

and the habit of the serial extension of the calices, together with the presence of a rudimentary or papillose columella, show its affinity with the Thamnastraeans. The subgenus Oroseris is distinguished from Comoseris by the limited extent of the collines, which do not traverse the entire length of the colony as in Comoseris, and in this respect our specimen is in agreement.[1] A closely allied species to ours is Comoseris (Oroseris) regularis, Fromentel, which, however, has fewer septa, and a more pronounced papillate columella.[2] This subgenus is represented in the Jurassic, Neocomian, Cretaceous, Eocene and Miocene formations. In the Eocene it is known from Europe, and in the Miocene from Italy.

Locality and Horizon.—Valley of the Moorabool, at Maude. "From irregular bands of limestone not more than 2 ft. thick, interstratified in the upper part of the older basalt." C. S. Wilkinson, Dec., 1865. Coll. Geol. Surv., Vict. (WTM2). Tertiary (Barwonian). [9153].

Class—Echinoidea.

Family—*Cassidulidae.*

Genus—*Studeria*, Duncan.

Studeria elegans, Laube sp.

Catopygus elegans, Laube, 1869, Sitz. d.k. Akad. d. Wissensch. Wien, Vol. LIX, p. 190, Pl. Figs. 8, 8 a-c. Tristomanthus elegans, Bittner, 1892, Sitz. d.k. Akad. d. Wissensch. Wien, Vol. CI., p. 352, Pl. IV., Fig. 3.

Observations.—Hitherto this echinoid has been recorded for Victoria only from the mouth of the Glenelg River, near the S. Australian Border, and from Apsley. In S. Australia it occurs at the Murray River and Mt. Gambier.[3] It is therefore interesting to record its occurrence at another, widely removed, locality in Victoria. The specimens, of which there are six

1 See Duncan, "Revision of the Families and Genera of the Madreporaria," Journ. Linn. Soc. Lond., Zoology, vol. xviii., 1885, p. 163.

2 Pal. Franç., vol. viii., p. 478, pl. 117, figs. 2, 2a.

3 See Dennant and Kitson, Catalogue of the Described Species of Fossils in the Cainozoic Fauna of Victoria, S. Australia and Tasmania. Records of the Geol. Surv. Vict., vol. i., 1903, pt. ii., p. 131.

examples, were collected some years ago by Mr. J. H. Gatliff, who has presented them to the Museum collection. They are somewhat small, but otherwise typical, so far as can be said of a species in which no two examples are exactly alike in form.

Locality and Horizon.—Spring Creek Beds at Torquay. Tertiary (Janjukian). [9147-52].

Family—SPATANGIDAE.

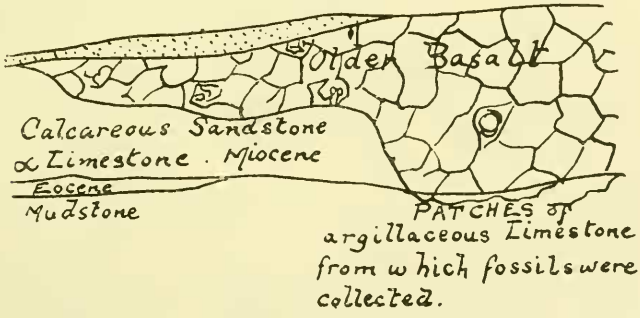
Genus—*Linthia*, Merian.

Linthia antiaustralis, Tate.

(Pl. XIX.).

L. antiaustralis, Tate, 1885, Southern Science Record, Vol. I. (New Ser.), No. 1, p. 4.

Observations.—The above species was described by Tate from the Murray River Cliffs, but there has been no previous record of its occurrence in Victoria. The example now recorded from Curlewis was collected by R. Daintree, and it was sent to the National Museum with other tertiary specimens from the Geological Survey Office in April, 1861. Daintree's note as to the precise spot where the fossils were obtained is as follows :—"These fossils were collected from the base of the cliff on



COPY OF SKETCH-SECTION TO SHOW SUPERPOSITION OF STRATA AT CURLEWIS (Ad 12), BY RICHD DAINTREE, APRIL, 1861.

which a fenced-in grave stands; the argillaceous limestone from which they were taken has been upheaved by the intrusive basalt, and where the limestone was sufficiently pure it has been converted into a coarse kind of marble." The Survey reference to the locality is Ad. 12, Section 23, Block 1, Parish of Moolap. A sketch is added by Daintree, which is here reproduced. Linthia antiaustralis was described, but not figured by Professor Tate. It may therefore be appropriate to give illustrations of the present example. The species differs from the living L. australis, as Tate points out, amongst other features, in its greater height, less tumid sides, and the shallower ambulacral zones having the anterior pair a little longer than the posterior, as compared with L. australis, in which they are of about equal length. Another important character is the difference in the angle of divergence in the posterior pair of ambulacra in the two forms, that of L. antiaustralis being 50 deg., whilst in the living species it is 43 deg.

Locality and Horizon.—Curlewis, near Geelong. Tertiary (Barwonian). [9154].

Genus—*Maretia*, Gray.

Maretia anomala, Duncan.

Maretia anomala, Duncan, 1877, Quart. Journ. Geol. Soc., Vol. XXIII., p. 52, Pl. IV., Figs. 1-4.

Observations.—An incomplete specimen of a very large example of this handsome echinoid occurs in the National Museum collection. It was purchased from Mr. J. F. Bailey, who obtained it from the Beaumaris Cliffs. There is no doubt as to the accuracy of this locality, since this is sufficiently shown by the matrix of the specimen.

Duncan gives $2\frac{3}{4}$ inches as the length of his type specimen, and $2\frac{1}{2}$ inches as the breadth. The present specimen has a breadth of $3\frac{1}{4}$ inches, while the length when complete would have been about $3\frac{3}{4}$ inches. The locality which Duncan gives for the type specimen is the Mouth of the Sherbrook River (loc. cit., p. 53). Messrs. Dennant and Kitson, in their Catalogue of Cainozoic Fossils,[1] give an additional locality, Aldinga.

1 Records Geol. Surv. Vict., vol. i., pt. ii., 1903, p. 131.

The present record is made from a higher horizon than that of the Sherbrook River. Further specimens from the same locality may show a varietal difference, but so far as can be seen ours agrees in all essential characters, and only differs in size.

Locality and Horizon.—Beaumaris, Port Phillip. Tertiary (Kalimnan). [4829].

Genus—*Eupatagus*, Agassiz.

Eupatagus rotundus, Duncan.

Eupatagus rotundus, Duncan, 1877, Quart. Journ. Geol. Soc., Vol. XXXIII., p. 53, Pl. III., Figs. 14-17.

Observations.—This species is not very abundant in our Tertiary beds. It is readily recognised by its exceptionally large size compared with the other Australian examples of the genus, the almost circular ambitus, the greater proportional height of the vertex, which is $\frac{2}{3}$ the length of the test, the nearly centric position of the apical system, and the sharply angulated peripetalous fasciole.

A fine specimen of this echinoid has been presented by Mr. F. P. Spry to the Museum collection [9156]. The test is partly encrusted by a hard pink or reddish brown limestone, and the fossil itself is of a brick-red colour. This specimen was said to be from Muddy Creek, but the exact locality was open to doubt. During a recent visit to the Hamilton District I was able to locate the bed of limestone from whence the present example was obtained. It is best developed at the junction of the Muddy Creek with the Grange Burn, and this particular fossil must have come from near the junction or below, on on the Grange Burn, since it is there that the reddish-coloured limestone occurs. The latter occurs as a very thick bed of foraminiferal and polyzoal rock (Amphistegina and Cellepora being the predominant genera), and throughout the bed are scattered numerous tests of echinoids, chiefly of Eupatagus rotundus. I also found a portion of a very large echinoid, probably referable to Linthia gigas, McCoy sp. This bed of foraminiferal and polyzoal limestone occupies a position immediately over the richly fossiliferous clays best seen elsewhere at Clifton Bank;

and it can be traced up the Grange Burn to within a short distance of Forsyth's, where it is overlain by the nodule bed and the Kalimnan shelly deposits. By the percolation of surface water the limestone has been fretted and excavated into numerous "swallow-holes" and caves on the Grange Burn opposite Mr. Henty's farm, where it perhaps attains its maximum thickness.

Duncan's original locality for this species is the Tertiaries of the Murray River (loc. supra cit.). Since then the species has been discovered in several localities, but apparently not at Muddy Creek. Messrs. Dennant and Kitson[1] have given the distribution of E. rotundus as follows:—Aire Coast?, Gellibrand River, Glen Aire, Calder River, Maude, Waurn Ponds, Murray River, Spring Creek, to which should now be added Muddy Creek and Grange Burn, near their junction.

Order—Polyplacophora.

Family—*Ischnochitonidae.*

Genus—*Ischnochiton*, Gray.

Sub-Genus—*Ischnoplax*, Carpenter.

Ischnochiton (Ischnoplax) granulosus, Ashby and Torr sp.

(Pl. XVIII., Figs. 5-7).

Acanthochites (Notoplax) granulosus, Ashby and Torr, 1901, Trans. Roy. Soc., S. Aust., Vol. XXV., p. 139, Pl. IV., Fig. 9.

Observations.—The above species was founded on median valves from the Balcombian clays of Schnapper Point (Balcombe's Bay, Port Phillip). Curiously, three out of five specimens of this fossil in the National Museum collection are tail-valves, and since this part of the external covering has not yet been described, details are now given, with drawings from two of the specimens.

This species must be transferred of the genus Ischnochiton, occasioned by the discovery of the tail-valve, particularly characterised by a callus-termination of the posterior border of the articulamentum; and to the sub-genus Ischnoplax, since the shape

1 Op. cit., p. 132.

of the valves indicate a narrow body, with an elevated posterior valve and a posteriorly situated mucro. In view of the fact that Acanthochites, subgenus Notoplax, is distinguished by the numerous slits in the articulamentum of the tail-valve, which latter also projects beyond the integumentum posteriorly, it is difficult to discern the ground upon which the original authors of this species founded their conclusions as to the genus in which it should be placed, seeing that they record only median valves.

Description of Posterior Valve.—Dimensions — Specimen a. [4843]: Length, 7 mm.; greatest width, 7 mm. Specimen b. [4842]: Length, 8.5 mm.; greatest width, 9 mm. Distance from point of mucro to external posterior border, 2.5 mm. Height at anterior margin, 3.75 mm. (specimen a). Width of sinus (spec. a), 3 mm.; (spec. b), 3.75 mm.

Dorsal area bluntly wedge-shape, the summit, ending in the mucro, roundly ridged and bearing about 16 longitudinal striae, which become broken at the sides into rows of elliptical or elongate-subquadrate beads. There are about 14 of these bead-like striae on each side of the dorsal slope, over which they are disposed in a radiately curved manner, and focussed on or around the mucro. There are two beaded striae to one intermediate and shorter. Area behind mucro, plane, undulate or slightly concave, ornamented with numerous small pustules arranged in a rather obscurely quincuncial pattern. The outer borders of these pustules each carry a pigmented centre, slightly depressed, showing the presence of the rudimentary eyes. The articulamentum is of a pale creamy yellow, contrasting with the pale sage-green colour of the tegmentum. As seen from the under side, it is thickened and wrinkled by divergent ridges on either side of the mucronal pit, and is delicately crenulated on the posterior border. The sutural laminae are produced 1.25 mm. beyond the tegmentum, as seen from the upper surface.

Affinities.—Of living species of the sub-genus there appears to be only one well-authenticated example—viz., Ischnochiton (Ischnoplax) pectinatus, Sowerby sp.,[1] whose habitat is in the West Indies (Cuba, Guadaloupe and Barbados). The salient differences between the recent and the fossil form are the den-

1 Chiton pectinatus, Sow.; Ann. Mag. Nat. Hist., 1840 (June), p. 288, pl. xvi., fig. 3. See also Tryon and Pilsbry, Manual of Conchology, vol. xiv., p. 64, pl. xvii., figs. 25-30.

ticulate posterior margin of the articulamentum of the tail valve, and the slightly greater elevation of the dorsal area in the former.

Locality and Horizon.—Balcombe's Bay, Port Phillip. Tertiary (Balcombian). Collected by Mr. W. Kershaw.

For valuable assistance in comparing these fossils with the living types, I am much indebted to Mr. R. A. Bastow.

EXPLANATION OF PLATES.

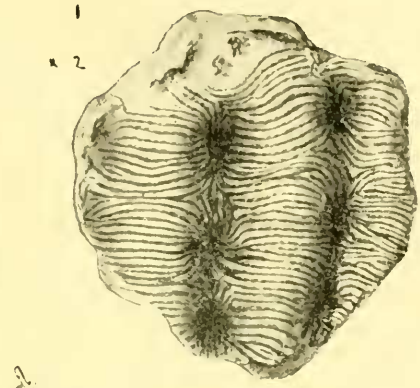
Plate XVII.

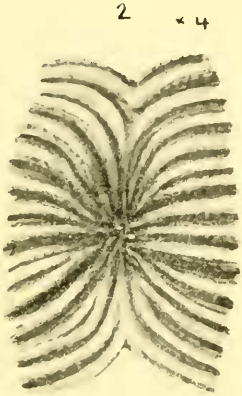
Fig. 1.—Spicules of *Ecionema newberyi*, McCoy sp. An oxea; slightly curved form (the principal skeletal spicules).
Fig. 2.—An oxea, having a sigmoidal curve.
Fig. 3.—Protriaene, with straight cladi.
Fig. 4.—Protriaene with curved cladi.
Fig. 5.—Dichotriaene.
Fig. 6.—Another, fragmentary specimen.
Fig. 7.—Microrabd (microstrongyle), showing pitted surface.
Fig. 8.—Probably a spiraster, with spines developed towards one end.
Fig. 9.—Microxea, with whorls of spines.
Fig. 10.—Spheraster, with arms terminated by spines.
Fig. 11.—Sterraster.
Fig. 12.—Sanidaster.
Fig. 13.—Protriaene, with sigmoidally curved cladi.

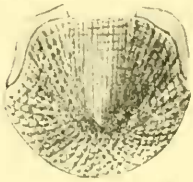
All figures on the above plate magnified 52 diameters.

Plate XVIII.

Fig. 1.—Comoseris (Oroseris) australis, sp. nov. A drawing from a wax squeeze. × 2.
Fig. 2.—The same. A calice more highly magnified. × 4.
Fig. 3.—Cliona mammillata, sp. nov. Natural casts of the chambers. × 2.
Fig. 4.—?Cliona peregrinator, sp. nov. A natural cast. × 2.
Fig. 5.—Ischnochiton (Ischnoplax) granulosus, Ashby and Torr. sp. Posterior valve, dorsal view. × 3.
Fig. 6.—The same; side view. × 3.







F.C. del.

Victorian Tertiary Fossils.